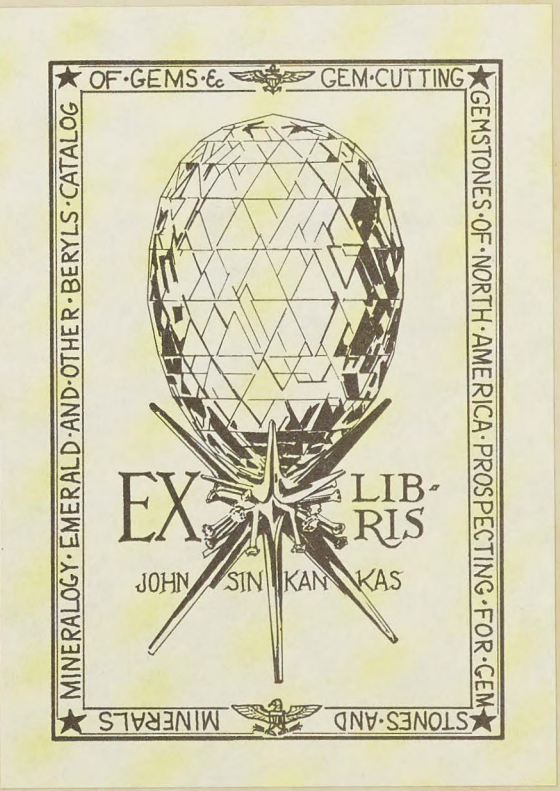
THE SCIENCE OF DIAMONDS

BY

Chandler B. Chester.

Be Your Own Judge.

The ONLY SELF-EDUCATIONAL Book On Diamonds In The World.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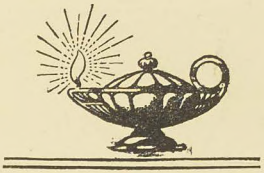
THE ONLY ONE OF ITS KIND IN THE WORLD

By
CHANDLER B. CHESTER



A PRACTICAL hand book of references, containing definitions of lapidary's terms, colors, characteristics, localities of precious gems, methods of mining, etc.

Showing in a tabulated form, the chemical composition, crystallography, lustre, hardness and describing methods of testing, mineralogical characteristics and a brief history of the famous diamonds of the world, including the zodiacal signs of precious gems, etc.

A new light on an old subject, tabulated, concise, authoritative. A handy manual for every person interested in diamonds.

CHESTER & BERGMAN,
PUBLISHERS
C H I C A G O

PREFACE

MY idea in compiling this little book is to make it a "Self-Educational" work for the GENERAL PUBLIC, as well as for the jewelers, dealers, etc. There are many people in all parts of the world who are purchasing diamonds every day, who know very little, and some, absolutely nothing about these gems; one reason for this, dealers not being over anxious to educate the public on diamonds, the other reason is, it is almost impossible to get any information, in the form of a book, that is easily understood and having all the points one should know without having to make a long study to be able to judge for themselves. The diamond is in a class all by itself.

While there are some very fine works put up for the jeweler, expert, or diamond cutter, these are either on the cutting, history, crystallography, or mining, and do not take in the diamond in general; hence I have published this book, taking in all these subjects in a condensed form, with the idea that it will be a condensed book of facts and essential points one should know on the diamond.

It is not the author's intention to give much of a history on diamonds in this work, but rather the actual diamond, its cuttings, colors, imperfections and the most important points of these gems.

There are some deceitful practices used in selling diamonds, by a few unreliable dealers, and as the manufacturing of better

imitations is making it harder to tell a diamond without scientific tests and knowledge, a purchaser should have all of the essential points on these gems, in order to make a good selection.

If the reader will carefully follow this book through from beginning to the end, you can rely on your own judgment and will not have to take the "other fellow's" word for what you are getting.

Yours very truly,

Chandler B. Chester,

Diamond Expert.

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THE SCIENCE OF DIAMONDS

Characteristics and Localities of the Diamond.

Diamonds are natural carbon, or a pure crystalline form of carbon, of which bort is the imperfect and carbonado the crypto, supposed to have been crystallized by the heat of the earth or of a volcanic origin. Partly crystallized particles of carbon have been found in the ground where meteors have fallen; this showing that intense heat will crystallize carbon. It is supposed in the formation of the earth that particles of carbon, being subjected to a very high degree of heat, became crystallized, turning from a black color to a white crystalline form of carbon, or a diamond. The various colors of diamonds are caused by the different degrees of heat, to which the stone has been exposed. Hence a strata of ground bearing a yellow or brown grade of diamonds, happened to be in a different zone of heat than one lying next to it and bearing a white grade.

Diamonds are found in the blue ground or clay which is found in great quantities in South Africa, but is not limited alone here, and has been found in the German Colonies in Southwest Africa, which, so far, have failed to reveal any diamonds. Many years are required and spent in finding of the blue ground, bearing diamonds. However, the Germans in their African Colonies

have established diamond mines and produce a good quality of stones.

In May, 1908, a diamond was found east of the Luderitz Bay, and after a thorough search more stones were found in this same locality. The diamond here occurs in soil consisting of from 70 to 80 per cent red dune sand and from 20 to 30 per cent fine colored gravel. It seems the diamond is dependent upon this colored gravel, for wherever this is absent, there are no diamonds found.

The depth of the diamond bearing deposits vary from six inches to one foot. About 650 carats are taken out daily from this locality, and about 500,000 carats are mined every year. The stones are very small here, but their quality is excellent. One of the oldest mines was in Borneo; in the year 1738 diamonds to the value of two millions three hundred thousand dollars were mined in this locality.

A diamond was found at Kimberly in 1905 with a small garnet in it. This stone weighed about 114 carats, and the garnet was estimated to weigh about half a carat. This tends to support the old theory that diamonds grow like onions, layer by layer.

The first stones in Brazil were found in the year 1729. Brazilian diamonds are classed as the best stones ever mined. The famous "blue white" grade of diamonds come from this locality. The largest diamond ever found in Brazil weighed 254½ carats in the rough. This is the famous "Star of the South."

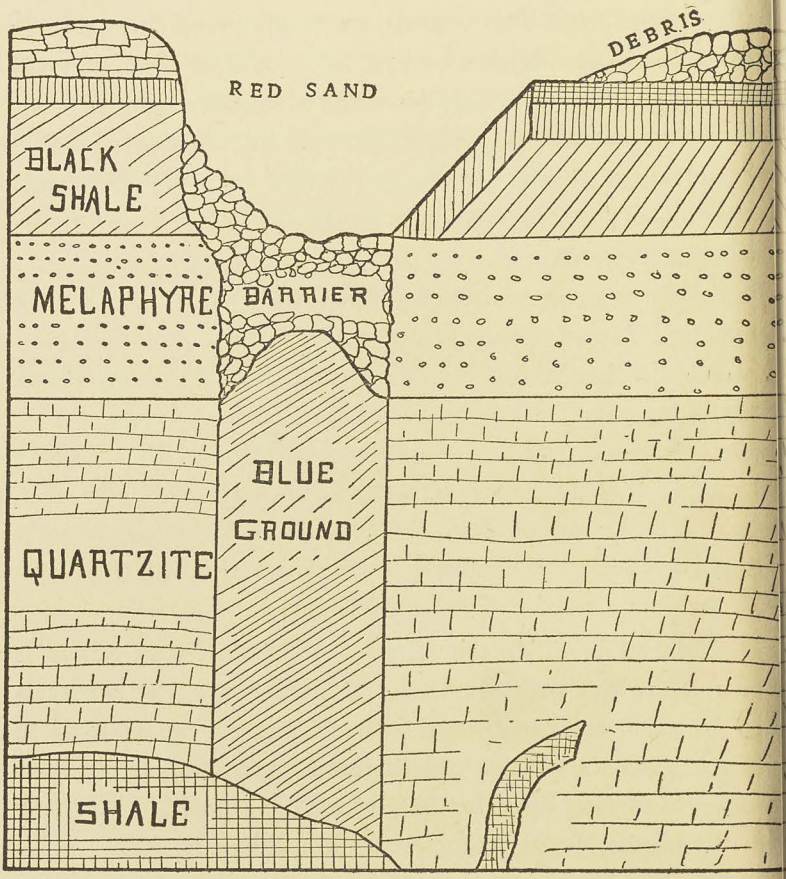
So rare are diamonds that only one carat of diamonds is found in every 39,999 pounds of the blue ground, and it takes about 2,000 carats to make a pound. This means that only one pound of rough diamonds is secured from every 60,000,000 pounds of

blue ground bearing diamonds. This portion is gradually becoming smaller as the mines increase in depth. Of the diamonds mined, weighing less than one-half a carat, only six per cent can be cut so as to be "flawless and perfect." About sixty per cent are thin flat stones, or are broken, cracked or full of carbon spots and other imperfections. The majority of this class are split and made into little stones; the balance are fit for mechanical purposes only, or for pounding into dust with which to grind and polish other diamonds.

Some of the more important diamond districts in Brazil were Diamantina, Mogul, Grao, Bagagem, Yoyax and Matto Grosso, of which the combined productions amounted to about 40,000 carats in the year 1900. At present South Africa is the world's greatest diamond field, and supplies nine-tenths of the commercial world. The four most important mines are near Kimberly, namely: The Kimberly, The De Beers, The Bultfontein, and the Wesselton. The first diamond in South Africa was found in 1867, and had a weight of about 21 carats.

The mineral in which the diamond occurs in South Africa is known as the blue ground or blue clay, and consists of a breccia filled with volcanic mud from below. These pipes or funnels have a diameter of about one thousand yards, and in the blue ground which they contain the diamond is found in company with the garnet, augite, other stones and minerals.

The Jagersfontein mine, of the Orange Free State, in the year 1909 yielded rough diamonds to the value of $1,778,495. The Premier mine in 1909 produced diamonds to the value of $5,278,348 (not including the "Cullinan Diamond"), in the rough, and



SECTION OF DIAMOND BEARING GROUND, SHOWING FORMATION OF THE BLUE CLAY

since the discovery of this famous mine, is credited with a total valued production of about $24,000,000.

The degrees of hardness in the diamond may be classified as follows: crystalline hardness, 10 specific gravity 3.48 to 3.52; carbonado hardness, 3.14 to 3.41. Diamonds will burn in oxygen under an intense heat to a form of dioxide carbon, without residue.

Diamonds were first discovered in India, and furnished the sole supply of the world until the Portuguese found them in Brazil in the year 1728.

These diamond bearing mines are really extinct craters or volcanoes, and are filled with this blue ground, which is nothing more nor less than lava. These craters are large holes in the solid rock. The lava has at one time been forced up from the interior of the earth.

Pure steel contains myriads of microscopic diamonds or carbon crystals. The diamond acquires positive electricity by friction and is a non-conductor of electricity; infusible but volatilized by long-continued heat; transparent and translucent.

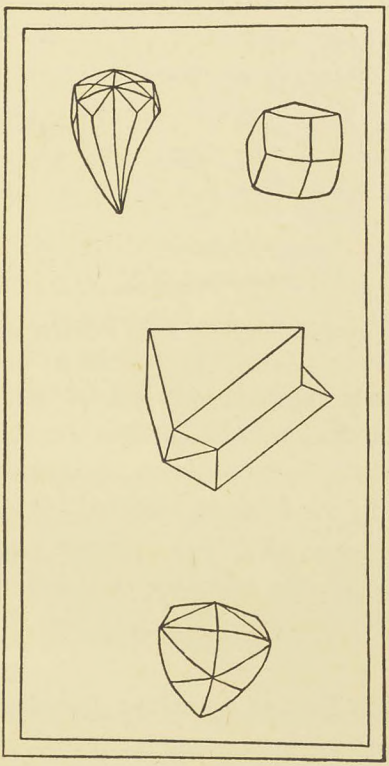
Diamond Mining.

By the use of automatic machinery, the blue ground is dumped on a depositing floor and exposed to the sun and rain, which disintegrates same. This is also done sometimes by the use of auto-

matic machinery instead of disintegrating in the air. One of the modern methods of separating diamonds is known as the "Grease Separator" method, which has proven so valuable and economical that this system has been installed with considerable success in many of the up-to-date mines. This consists of various tables made of corrugated iron, with transverse grooves about three-eighths of an inch deep, which are continually vibrating. The grooves are filled with tallow, and as the muddy water passes over them, the diamonds adhere to the grease. At intervals the tables are cleaned with rubber scrapers, the grease is melted, to be used over again, and the diamonds, having been precipitated to the bottoms of the kettles, are cleaned and assorted.

Sometimes the blue ground is put into a washing machine, where the diamonds are separated and sifted through various sizes of sieves by forcing water over them, the force of the water automatically dropping the diamonds through these sieves. After the stones are collected from this machine, they are sent to a large assorting room, where they are graded and classified in the rough as to their shape, weight, size, colors, etc.

Crystalline form of diamonds, showing the diamond in the rough, coming from the ground in their natural state and after being run through the various washing machines in this manner of mining. They are sent in this form to the diamond cutters, where they are ground, polished and finished for the market. The diamond is one of the most perfectly crystallized of minerals, and almost every single stone is bounded by more or less regular faces, and are generally found to be formed into cube, octahedron, rhombic, dodecahedron, tetrahedron and hexa-octahedron shapes.



CRYSTALLINE FORM OF DIAMONDS.

This valuable blue ground is protected by an immense inclosure having high fences around it, and is also roofed over with a fine wire netting. Sometimes this is charged heavily by electricity, to prevent the natives at work in the inside from throwing the diamonds to accomplices on the outside. The natives who are employed in the mines are not allowed at any time outside this enclosure until their term of contract has expired, when they are stripped naked and, after being held for a few days, are allowed to depart. They have been known to swallow the smaller stones.

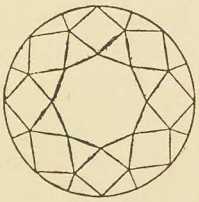
Diamond Cutting and Finishing.

The art of cutting stones is quite old, in fact, it is thought to have been first practiced in India, but it is also reported that there was a diamond cutter in Nuremberg, Germany, about the fourteenth century. In the fifteenth century, diamond cutters were well known in France, who, by a different combination of the facets, obtained a peculiar effect for each individual stone, thus producing the Brilliant, Rose, Marquis, Pear Shape, and other fancy cuts.

The rough native form of crystalline diamonds has little or no brilliancy, and until after the stone is formed and shaped by the cutter's hands, it does not commence to show any powers of refraction. This brilliancy can be increased by the addition of a greater number of facets, in other words, a diamond's refractory powers can be increased by finer cutting of the angles or facets on the prism. The cuttings, proportions, shape and color of the

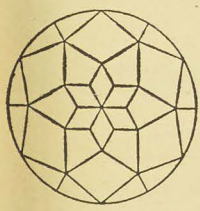
stone are the factors which produce the actual commercial value of the cut diamond when finished.

Almost all diamonds of the present time are cut round or "Brilliant," this being the most desirable cut today, but which, in many cases, necessitates a sacrifice of size and brilliancy. This brilliant cut was first produced with the crown of the stone cut considerably higher than the present flat crown; these were called "The Old Mine Cut," but cutters of the present time are shaping the upper half of the diamond more shallow, making the table of the stone, which is a regular octagon, much larger in proportion. A perfect Brilliant cut consists of 58 facets, 32 facets above the girdle and 25 facets on the pavilion, and the table. This brilliant cut is sometimes improved by the addition of 8 star facets up to 64.



Brilliant cut with Table.

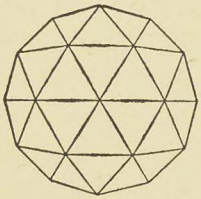
The Twentieth Century Brilliant Rose cut consists of 88 facets, but this is now cut with only 80 facets. The Marquise Brilliant cut has 72 facets, the Crowned Rose cut is applied to small diamonds and consists of 24 facets.



Brilliant cut with Star Facets in place of the Table

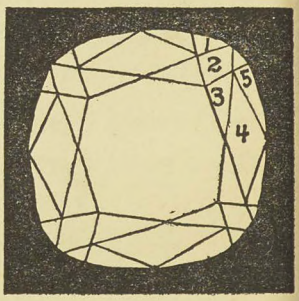
A well-proportioned rose cut is one-half its diameter in thickness. Some other cuts are The Huitapan or double cut, the 24 facets or single brilliant, the Cabachon or Carbuncle cut, which is applied to oval-shaped stones having a flat or slightly curved base, and is either flat, convex, or double convex, that is arched. It may be on both sides or only on one.

This cut is particularly applied to semi-transparent gems, such as the opal, moonstone, etc. There are three forms of this cut, the single, double, and mixed cabachons cuts. The Trap or Step cut and the Table cut are both applied to stones having a flat surface. The Rose cut is bounded on the under side by one single large face, which forms the base for the whole stone, the lower portion being entirely absent, forming a pyramidal shape. The facets are cut into a multiple of six, and are arranged in groups of two, the Star facets and the Cross facets only, in this form of cutting.



Rose Cut.

A diamond possessing great brilliancy can be spoiled by imperfect cutting. Showing the top view of an imperfect stone, one can readily see at a glance that this is an imperfect cut, and while this stone may be of a good color and of the right proportions, this off-cutting will greatly decrease the value of the gem, but it can be mounted so that this will not show unless upon a close examination of the setting.



Imperfect Cutting.

No. 1. Skill Facets.
No. 2. Quoins or Lozenges.
No. 3. Star Facets.
No. 4. Templets or Bezils.
No. 5. Cross or Skew Facets.

A diamond chip is an uncut piece, chipped or cut from a larger stone, but small stones may be cut the same as regular stones,

so do not confuse the "chip" with the small cut diamond. The name "melee" is applied to the smaller cut stones; these are generally used to fill in around larger stones for a border, and are mostly imperfect or diamond chips. A large diamond of good color, say, a stone weighing about three carats, may become badly nicked or scratched by rough handling, or it may not be perfectly cut relative to the edges, etc. On stones of this size and grade it will pay to have this diamond polished, the nicks and scratches taken out of it, and a nice fine polish ground on the facets, or if the girdle is roughly finished in places, as a great many stones are turned out, in order to get the weight, a little attention given to this point by some first-class lapidary, which can be done at a very small cost, will give the stone considerable more life.

The Lapidary's Work-Shop.

What would impress a visitor most forcibly upon entering a modern lapidary's work-shop is the extreme simplicity and almost primitiveness of the tools and instruments in use.

This is the keynote to the art of cutting and polishing the diamond, for the work is essentially a matter of skill and judgment. In the cutting and polishing of the diamond, the most delicate manipulation is required, as the least particle taken off needlessly, or the slightest error in judgment, may mean considerable diminution in the value of the stone. To a first-class diamond cutter, every stone is an individual study. The polishing of a diamond is a laborious process, requiring the greatest accuracy.

Diamonds are taken from the mines in all sorts of shapes

and sizes. The first process in cutting a stone is to reduce the rough native form of crystalline diamonds to an eight-sided figure, or an "octahedron." This is done by the process of cleaving, the rough sides being split away by hand with a knife-like instrument called a "cleaver." The octahedron is now cemented into the end of a revolving spindle and, as it revolves, another diamond is held so that the corners of the revolving stone touches it.

The stone on the spindle gradually is shaped round. This process is the "cutting" of a diamond. The process of putting on the facets is called the "polishing." The polisher imbeds the diamond into a lead holder or shank, which is done by heating the lead and inserting the diamond into the molten metal, leaving only a small portion exposed. The stone thus held in the shank is pressed against the surface of a steel wheel, revolving horizontally at a speed of 2,500 revolutions per minute. The surface of this wheel is covered with a mixture of diamond dust and olive oil.

Only one facet can be ground on at a time, and for every facet the diamond must be removed from the shank and the lead reheated for a new insertion. The first facet ground is the large top one, or the table of the diamond, then the eight large facets around the edge and eight small facets around the edge of the table are now ground on, which divides the eight large facets around the girdle of the stone into sixteen smaller ones.

The top or crown of the diamond is now complete. The bottom of the stone is polished in the same way, but with only twenty-five facets in the present round brilliant cut. The dia-

mond itself does not revolve in the process of polishing the facets, but is held firmly in the shank by the lead.

The ancient way of grinding was a wheel or disk, revolving at a high rate of speed, on which the diamond was held by hand by the polisher.

The diamond cutter gets his angles, and so many seconds being allowed to each angle or facet, this being timed by a watch, he first using a coarse diamond dust mixed with olive oil, gradually mixing finer and finer, until the polish is obtained which finishes the diamond for the market.

The grinding of a large diamond requires from three days to a year, according to the hardness and direction of the grain of the crystal and how much time the cutter wants to spend on the finishing touches of the stone. The cuttings from diamonds are saved, the chips or melee, as the smaller stones are called, which, being too small for commercial use, are ground into diamond dust, which is used to grind and polish other stones; hence the saying, "Diamond Cuts Diamond."

Besides the general form of cutting, diamonds are sometimes cut into a single cut brilliant stone, not having full complement of facets, which does not, however, necessitate a lack of brilliancy. It is sometimes necessary to divide a rough diamond into halves, or to remove a small projecting corner from a large stone. This is done by the process of "cleavage," which is the natural tendency of the diamond to divide along certain planes parallel to the facets of the octahedron, this being the actual grain of the diamond.

The diamond cleaver must have an extensive knowledge of crystallography in order to be successful in his line. There are only a few diamond cleavers in the world, and they earn from $8,000 to $12,000 per year.

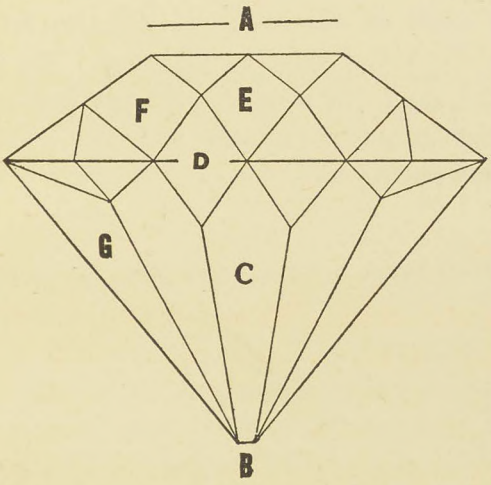
The wages of men who cut and polish diamonds, skilled laborers of the highest type, run from $40.00 to $200.00 per week. There are about 500 members of the "American Diamond Cutters' Protective Association," and they have an iron-clad agreement providing that only sons or brothers of men now at work at the trade may be apprenticed to it.

A well-formed diamond loses almost half of its original weight in the cutting. Thin cleavage or slice-like pieces of diamonds are sometimes polished and, with one very large facet on either side, surrounded with a few small facets at the edge.

Almost all of the diamond grinding and cutting is done at Amsterdam, Holland; England ranking next. However, Americans are getting so that, with the aid of modern machinery, they can compete with Eastern countries for skill and cheapness of labor.

Lapidary's Terms.

The following represents the technical parts of the cut diamond, as used by the lapidary.



PARTS OF THE DIAMOND.

A—THE TABLE, that plane which is formed by the truncature of the upper pyramid.

B—THE CULET, or apex of the diamond.

C—THE PAVILION, or lower half of the diamond from the girdle down (meaning tent shape). This forms two-thirds portion of the stone.

D—THE GIRDLE, or edge of the diamond.

E—THE BISEL, or Crown, that space which lies between the girdle and the table. This amounts to one-third portion of the whole diamond.

F, G—THE FACETS, or angles, which reflect the light on the prism.

The Table and Culet are regular octagons.

Various Colors of Diamonds.

A Tabulated Scale of the various colors of diamonds, relative to their commercial value.

The following classification of colors will give a good idea of the various colors of diamonds, and will also determine to a great extent the actual value of the stone. The color of the diamond being one of its most essential qualifications places the gem in its right commercial standing and value. This distinction should be very finely drawn.

BROWN.

Brown stones having a strong brown tinge. These have the lowest commercial value.

SLIGHTLY BROWN.

Slightly brown, well cut diamonds of this class often appear white, especially when mounted or viewed from the surface. A marked brown color, however, is revealed on close examining.

YELLOW.

Yellow stones possessing a decided straw color. These are next in value to the brown diamond.

SLIGHTLY YELLOW. (*Bye Water.*)

A faint straw color distinguishes diamonds in this division, like those slightly brown, when mounted, they are frequently mistaken for a white grade of stone, especially in their clearness and brilliancy.

WHITE OR STANDARD WHITE. (*Silver Cape.*)

Commonly called commercial white diamonds. These have a clear white color and when perfectly cut they are very brilliant. Although a number of unmounted stones will show a variation of colors in this grade of crystal, these are frequently sold as "white" and sometimes

as "pure white" or even "blue white" to persons whose eyes are not trained to the various colors of diamonds. The word "commercial" is used to cover almost any color of the diamond and is simply a term to "cover a multitude of sins" by unreliable dealers.

PURE WHITE. (*Crystal White.*)

A clear water white, which by many is regarded as blue white. Blue is the notable feature of this grade. When mounted or viewed from the surface, these stones often show a steel blue tinge. When correctly proportioned and cut, their brilliancy exceeds any of the lower grades.

BLUE WHITE. (*Jagersfontein.*)

These will show a decided blue color under a strong light. In the daylight this stone shows the blue tint to a certain extent, but artificial light will greatly intensify this color. Blue stones of this grade are cut from the blue white grade of crystal, generally of the finest water, the smaller blue stones coming mostly from the Brazilian mines. When light is allowed to pass through them, they will show a beautiful clear blue tinge. The greatest brilliancy possible is obtained in this and the following grade of blue-white diamonds.

VIOLET BLUE.

These are diamonds of the finest water and can be obtained from but a few dealers. To a discriminating buyer, this grade is the most attractive. Every stone should be a real gem in color. The finishing of this grade of diamonds is given extra care and attention. All points are carefully finished in order to get the greatest refraction from the diamond possible. This is the deepest shade of blue white stones possible to obtain.

BLACK DIAMONDS.

These are very rare. They are the hardest known substance in existence and have the specific hardness no other gem has. Their brilliancy is not great, but their value lies chiefly in the commercial use they are put to in the cutting of other diamonds.

A Few Rare Colors.

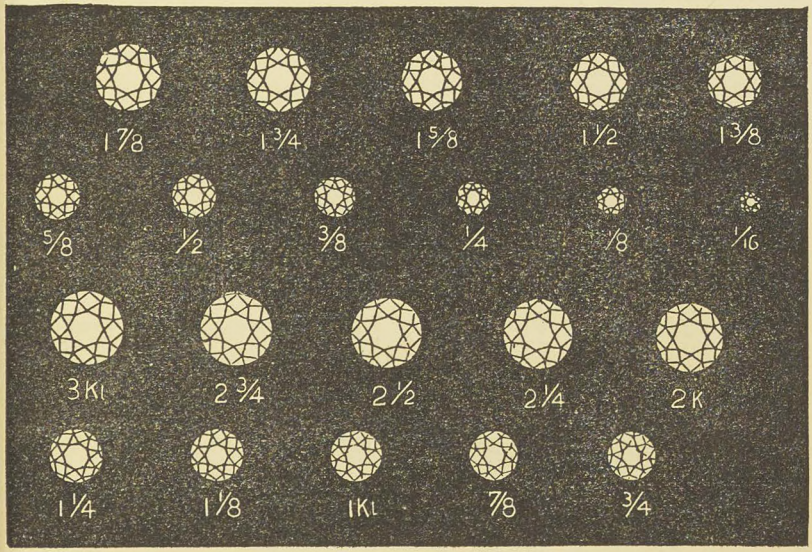
Fine canary, rich brown, green (Emerald), red or pink, orange, opalescent, and a few other unusual colors are sometimes found in the diamond, but, as a rule, they are not in demand, and their value is placed only on the rarity of these colors, and for this reason one should first determine the actual color of the gem in comparing one or more diamonds.

A diamond having a yellow or brown color can be drawn by an electric furnace (about 1,200 degrees Centigrade), of great heat to almost a pure white color.

In examining a diamond to ascertain its color, always do so in a good light. It is impossible to tell the actual color of any diamond in the night time under artificial light, as the confusion of the colors prevents one from looking through the crystal without absorbing the rays of light the gem is refracting under this artificial light. Daylight is the only good light to tell the actual color of the gem, and through various scientific tests it has been discovered that the NORTHERN light is the only correct light for this purpose.

Weights and Measurements.

The average size of diamonds.—While this scale will not hold accurate in all cases, as a stone may be a deep cut with a small surface, or a large top and a very shallow lower portion (a spread stone), this will hold true in the average run of good-proportioned

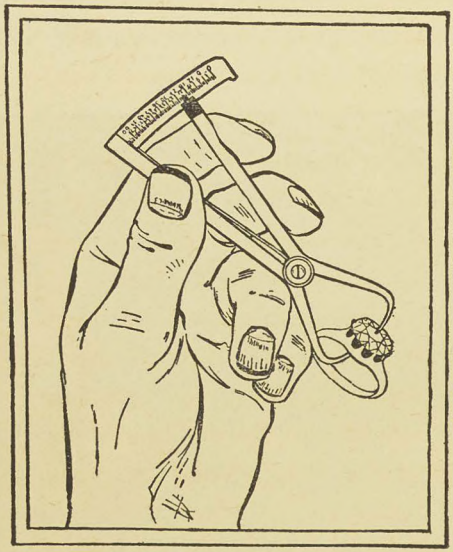


AVERAGE SIZE OF DIAMONDS.

diamonds. Diamonds were originally weighed by a "Karat" seed, which is found in South Africa. This was before the coinage of money in ancient times, when shells, teeth, etc., were used in place of money. The karat seed being taken for a stand-

ard of measurement, they are supposed to weigh exactly the same, one carat diamond having the weight of one karat seed.

The Diamond Guage.



DIAMOND GAUGE.

Showing, with the diamond guage, how the top and bottom of a diamond can be measured while in the setting, and with a calculator, the weight of a stone in its original mounting can be figured within a fraction of a carat, when scales for this purpose are not available. The calculator is a scale which is used with the guage and the weight of the stone is figured, not only from its dimensions, but from the weight of the edges, as a diamond having a heavy edge will weigh seven per cent heavier than one finished with a fine light edge, and both stones being the same breadth and depth.

The Refractometer.

"The refractometer is an instrument used in determining the actual absorption of light during its passage through the diamond. This instrument is used after the diamond is cut and polished, on account of the rough diamond being scratched and having a broken surface and having little refractory powers until after it is cut and polished.

"A characteristic of the transparent diamond is the extent to which a ray of light is refracted upon entering and leaving the gem. It would never do to contemplate cutting a diamond into a prism and measuring the refraction and double refraction of light in the usual way, hence the mode of procedure is to select two facets which form suitable angles, and then carefully paint over the remaining parts of the diamond; the ray of light can then be traced through these two facets and by this means the refraction and double refraction of the diamond may be measured.

"The refractometer consists of an eye-piece containing a graduated scale, through which can be seen a hemispherical glass lens. The diamond, after previously being moistened by a drop of some liquid possessing a higher power of refraction than itself, upon the plane surface of the hemisphere; a shadow may then be observed over one-half the field of view, its edge crossing the exact refractive index of the stone."

By the use of this instrument the actual brilliancy of any diamond can be measured to an accuracy. Every diamond is a multi-

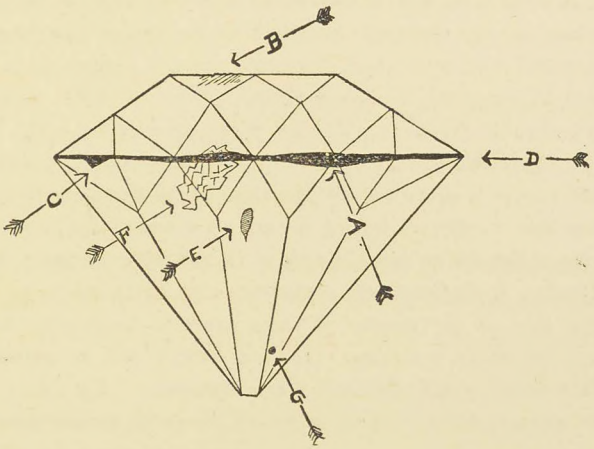
reflector, and light taken in at the table is reflected back by the facets at the bottom of the stone; hence the proper angles of reflection depend greatly upon the shape and proportions of each individual cut diamond.

Imperfections.

In examining a diamond, if possible, use a jeweler's lens, as some imperfections cannot be seen with the naked eye. A lens will show you many small flaws that otherwise would not be noticed.

Imperfections:—Showing where to look for flaws and various imperfections found in the diamond. There are several of the general run of imperfections represented in this cut, as found in the diamond as cut at the present time, and the following description will give an idea what each of these flaws will do towards diminishing the value of the stone. There are very few "perfect" diamonds being turned out from the cutters' hands today, as the importers and jobbers do not care to spend too much time on the individual stone, inasmuch as the time spent in finishing a perfect diamond represents considerable expenditure on each stone, and in finishing a diamond as it should be there is considerable loss of "weight."

Some diamonds will be found to contain only one of the following mentioned flaws, while others may contain several of them, but few diamonds are free from small imperfections of some description. Examine a stone carefully for any of the following described imperfections.



IMPERFECTIONS.

A Rough edge on the girdle of the diamond. You will notice that the edge of the diamond is unevenly finished, the diamond cutter not allowing sufficient time to be spent on this point to be nicely and properly finished. This stone can be set so that this imperfection in the finishing of the girdle will come directly under a prong or bezil of the setting and cannot be seen in a mounted diamond. It is always a safe plan in selecting a stone of any great value to examine it UNMOUNTED, so that any imperfections of the edge, if any, cannot be covered up in any manner by the mounting. The settings of some styles of mountings can also cover up the shape of the stone so that it will be impossible to tell if the gem is a perfectly round cut. A good many cutters allow the diamond to come out in this manner in order to make the stone weigh more. This will cast a shadow through the center of the stone, causing considerable loss of brilliancy.

B A scratch on top of the stone, which is liable to be found in this place on any diamond, inasmuch as the top or table being the most exposed part and while diamonds are the hardest known gem, they can be scratched if rubbed against a stone or brick wall, etc., or any other rough handling. A great many persons not being familiar with the characteristics of the diamond want to see if it will "cut glass." Of course a diamond will do this, as its hardness is much greater, but this manner of testing is very poor and is apt to take the stone's fine polish off or cause a nick if caught with the grain of any of the facets. A diamond will sometimes also be found to be scratched on the side of the crown. Always examine thoroughly the stone for any of these scratches. However, these can be polished out, but if a deep scratch, this will mean that one of the facets will have to be ground down, making it out of line with the remaining facets.

C A small nick in the girdle of the diamond, which may possibly be covered by a prong or bezil of the mounting. A diamond is often nicked by careless diamond setters on the edge, on account of the girdle being brittle or a very light finish.

D The whole edge of the stone is left finished too heavy, the diamond cutter not spending sufficient time on it to finish it as it should be turned out with a nice smooth, fine finish in all places. This is a very important and essential point to take into consideration as this thick edge will not only mean a dead weight but will cast a shadow through all of the facets. (See Dead Weight of Diamonds, page 39.)

E A feather in the crystal which can probably be seen with the naked eye upon a close examination. This gets its name from looking like a "feather" and is really a milky flake in the stone which cannot be cut away, formed in the crystalling of the carbon. These flaws vary in size from a small speck to one that can be readily seen with the

naked eye. This will give the diamond an appearance of being hazy and lifeless, if of any size.

F A fracture. These are generally found to be near the edge of the stone. A fracture is a diamond having been shivered either by a blow or carelessness in cutting or setting. These are found in the natural stone as well and will give the stone an appearance of being dead and hazy. A fracture of any size will greatly diminish the actual value of the stone. Fractures are found in minerals in directions where no cleavage may be found. These may be classified as follows:

No. 1. An even fracture, if the faces are on a plane without elevations.
No. 2. An uneven fracture.
No. 3. Conchordal fractures—showing conchordal surfaces.
No. 4. Splintry fractures—showing small splintered parts.

G Carbon spots. These are black specks in the diamond and are generally found in the top and lower half of the stone in pairs. However, one of these specks may be cut out in shaping the rough stone. Their size varies from a very fine spot to one that can be readily seen without the aid of a strong lens. It is a peculiar fact that these carbon spots are generally found in pairs in the diamond.

A diamond may also contain a bubble, caused by air forming in the carbon in crystallizing, or streaks or colors from gray to a dark brown. The lower part or culet of a diamond can be covered up in a mounting, not allowing sufficient light to pass through the gem, thus preventing its full strength of brilliancy from properly showing. A diamond set in this manner cannot refract properly in accordance with the ways that it was origin-

ally cut for, as the diamond cutter not only has to figure what shape he is going to get out of the rough stone, but how the rays of light will refract after the cutting of the prism, and if the lower part of the diamond is covered up by the mounting, the stone will have a dead and lifeless appearance and will not have the refractory powers it should show, as the cutter took this into consideration when he figured the cutting of the diamond.

A stone can also be set in this manner in order to give the back of same a flase plating of tin foil or platinum, the backing protecting it and preventing this being seen. This is sometimes done by unreliable dealers to give a dead stone great life and brilliancy. (See artificial coloring of diamonds, page 40)

Proportions and Depths.

A diamond to be perfectly proportioned should be an ample three-fifths (3/5) deep as it is broad. The selection of a diamond should be based upon this fact. A too deeply cut diamond has less brilliancy in proportion than one cut too shallow or spread. Sometimes a diamond is cut very shallow in order to get the greatest possible "spread," this being all that can be possibly cut from the rough stone, and is very deceiving to the eye. This gives the stone an appearance of being much heavier than it really is. These are called "spread" stones. Many people want a deep stone, supposing that the greater the depth the greater its brilliancy. This is an error: the diamond will lose its lustre in proportion to this unnecessary and useless depth. A perfect cut diamond should be perfectly cut round; if not, the facets do not bear the correct relation to one another.

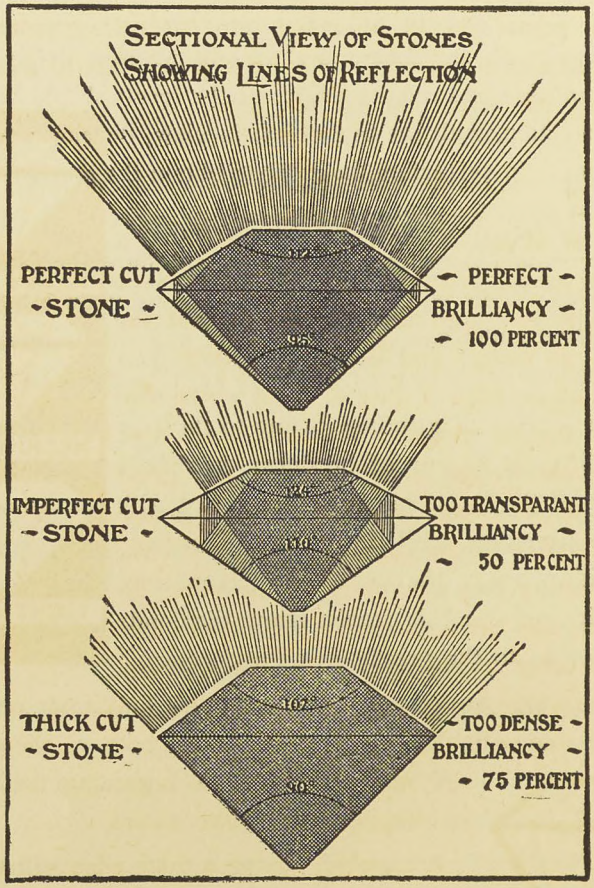
The Facets.

The facets on any diamond should be mathematically correct. The proportion and relative angles of the facets should be figured to a perfection, with the one object in view, development of the maximum light refraction, in order to obtain the greatest possible refraction from the gem.

Some cutters, in order to save time, will allow the facets to be cut uneven. This will not be noticed unless upon a very close examination under a strong lens. If the angles are unevenly cut, it will be impossible to get a perfectly round shaped stone.

In the process of grinding, owing to the fact that the diamond has a different degree of hardness, in different directions, the grinding of the facets can be accomplished with comparative ease in some directions, while in others the process is extremely long. To avoid injury to the stone the diamond must be ground with the grain, and for this reason many diamonds are not cut with perfection as to the grinding of the facets.

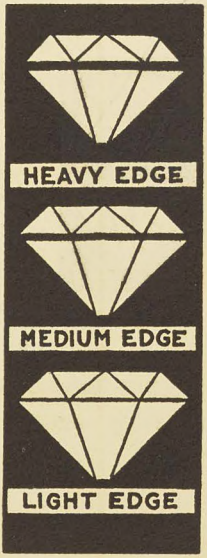
Showing the edges of the diamond as various diamond cutters allow the stone to come out finished. The girdle of any diamond should be evenly finished and nicely polished, smooth in all places. However, a great many cutters do not spend sufficient time on this point, not giving the proper time and care to the edges. There are several reasons for this. Diamonds being sold by the weight, it is to the jobber's benefit not to cut away too much of the stone, as the finishing of the edge of a diamond is a delicate manipulation, requiring much time and accuracy.



REFRACTION AND DOUBLE REFRACTION OF PERFECT AND IMPERFECT PROPORTIONED DIAMONDS

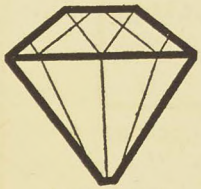
This brings the cost of cutting to a very expensive proposition, so the importer would have to get more for the stone.

These points should be taken into careful consideration in the selection of a diamond, and have a great deal to do with determining the actual value of the gem.



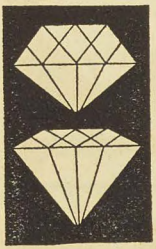
Dead Weight.

The cut at left shows the dead weight of a diamond having too thick an edge. The black lines show just how much of this part of the diamond is useless and has no brilliancy, just as thick as the edge is, just so much of the diamond is useless weight. This will amount to considerable weight in a stone of any great size. The percentage of dead weight in a diamond, relative to the edges, is seven per cent. In comparing two diamonds of the same dimensions, one having a coarse and heavy edge, and the other a fine light edge, the diamond with the coarse heavy edge will weigh just seven per cent more than the one with the fine light edge, and both of these stones will measure the same regarding the breadth and depth of these two stones.


Dead Weight

A diamond having a thick edge will also cast a shadow through all of the facets; this will not only confuse the colors of the stone, but will cause a loss of actual refraction of the gem, from 7 to 10 per cent, as measured by the refractometer.

The color, proportions, imperfections and brilliancy of the diamond determine its actual value, not only to the wearer, but to the importer and dealer as well, who buy the stones in their natural state at the mines before cutting.



Showing two poorly proportioned stones. The top of one is cut high, an Old Mine Cut, and the other stone is cut too deep in proportion to its surface.

The greatest possible brilliancy is obtained from a stone with the table two-fifths of the spread (this being the diameter through the girdle), and the spread almost twice the thickness, measuring the diameter from top to the bottom or apex of the stone, with the thickness divided one-third above the edge and two-thirds below the edge of the stone. These proportions will give the greatest spread, and the least possible weight.

The Artificial Coloring of Diamonds.

A yellow or canary colored diamond can be made to look perfectly white or even blue by dipping same into a cup of alcohol containing a few drops of India ink, or by applying an indelible pencil to the back of the diamond until the right color is obtained.

This practice is sometimes used by unreliable people to give a white grade of stones the desired blue tinge. It is always a safe plan to dip a diamond into a solution of muriatic acid before examining, as this will eat off any foreign substance or plating and artificial coloring the stone may have on the back of it, this

being invisible to the eye when properly put on. The acid will not hurt the diamond.

The artificial coloring of diamonds was first practiced early in India. The original method was to dip the rough crystal in a solution of coloring matter and after letting same soak thoroughly through the stone, place it into another bath of fixing matter, but the diamond being a non-porous substance, this method is not as successful as on other porous minerals, like the opal, etc.

The Real Value of The Diamond.

The diamond's chief value to the wearer lies in its beauty, and it is essential that the purchaser take this into consideration. It is frequently found that the smaller of two diamonds is preferable, one having the lustre and the other the weight. The smaller diamond is more desirable at the same price, and for this reason a smaller stone may be the same price as a larger stone, but being a very much better grade and having much more brilliancy.

The splendid individual beauty of the diamond is due in a great measure to the universal esteem in which it is held. When well-proportioned and polished, its refractory powers are wonderful, unlike those of any other mineral.

The endurance of the diamond gives it a place among the substantial investments of today. Many famous gems have an unknown age, their exact origin being unknown, and still they retain their original color and brilliancy. The increasing value of the diamond is due in a great measure to the growing appreciation of its beauty and the fact that it is inimitable.

The French have been working on the crystallizing of carbon for some years, in hopes they will eventually be able to manufacture diamonds by intense heat, but so far have failed to produce stones of any size with a commercial success. It will be impossible to manufacture a diamond having the original color and brilliancy of a natural diamond, in any size, for some time to come.

The following method of manufacturing diamonds has been used by the French with considerable success: A crucible is first filled with a very soft grade of iron and brought to the point of fusion by intense heat, and at the critical point, sugar of carbon is immersed into its center. The whole fused mass of metal is then plunged into an ice cold water tank, which forms a hard shell on the outside. The metal is then taken from the bath and exposed to the air. The iron mass remaining molten on the inside, expands with considerable force, and as it gradually becomes solid, the enclosed carbonic gas which is generated changes in the cooling, into minute carbon crystals, but these tiny crystals thus formed are too small for commercial use, and as the diamonds are dislodged by treating the iron encasement with various acids, the stones soon crumble to dust after being exposed to the air for a short time.

The Care of a Diamond.

A great many people often wash their hands in water and soap without first removing their diamonds. If the stone is set in a delicate mounting this practice will cause the diamond to become loose in time.

How to Clean Diamonds.

Dip the setting into a cup of alcohol, then drying same in a box of jeweler's sawdust, which can be obtained from any jeweler at a small cost, shake well in this, and then with a small brush remove the particles of sawdust which will cling to the setting. Be very careful not to force the stone in the mounting in any way.

Duties on Diamonds and Imitations.

Rough or uncut diamonds, not advanced in condition or value from their natural state by cleaving, splitting, cutting, or other process, including glaziers' and engravers' diamonds, not set, also diamond dust and miners' diamonds, are admitted to the United States *FREE.*

On drilled or undrilled, but not set or strung, cut and suitable for use in the manufacture of jewelry, a duty of *TEN* per cent is imposed.

On imitations of precious stones, including doublets, artificial or so-called synthetic or reconstructed rubies or other precious stones, a duty of *TWENTY* per cent is imposed.

All articles commonly or commercially known as jewelry, whether set or not set with diamonds, or other gems, or imitations thereof, a duty of *SIXTY* per cent is imposed.

Imitations.

Any imitation of the diamond will show more or less a black shadow in the center of the table. This shadow is always noticeable in imitations, especially glass. The culet of the stone can be seen very plainly and clearly in a genuine diamond, while in imitations it will show up more or less indistinct and hazy, and a black spot will be noticed in the center of the stone.

The diamond is quite transparent to the X-Ray light, while glass or other imitations are opaque. There has never been an imitation, with the exception of the diamond doublet, which a person with good eyesight could not detect the difference between a real stone and a cheap imitation, in a good light. No other substance has the wonderful refractory powers of the diamond.

The name "paste" imitations comes from cementing slice-like pieces of diamonds over glass or some other false bottom, with an invisible cement paste. In this manner the doublet is made. A reconstructed ruby is the fusing of powdered rubies by an intense heat into one solid ruby again. On account of the great hardness of the diamond this cannot be done with commercial success.

One of the best imitations of the diamond is the white sapphire. These are very hard and take a good polish. Their color is blue in the natural state. This, however, is drawn out by an intense heat to a white crystal. They are cut and sold like regular diamonds, but have no great value.

THE ZODIACAL SIGNS OF PRECIOUS GEMS.

The twelve apostles were represented symbolically by precious stones; these were called the "Apostle Gems."

JASPER	ST. PETER
SAPPHIRE	ST. ANDREW
CHALCEDONY	ST. JAMES
EMERALD	ST. JOHN
SARDONYX	ST. PHILIP
CARNELIAN	ST. BARTHOLOMEW
CRYSOLITE	ST. MATHEW
BERYL	ST. THOMAS
CHRYSPRASE	ST. THADDEUS
TOPAZ	ST. JAMES THE LESS
HYCENTH	ST. SIMEON
AMETHYST	ST. MATTHIAS

Almost all of the original fiction regarding precious gems comes from the European countries, credulity of the Jews. The diamond is a symbol of purity, supposed to preserve the peace and prevent storms; also an emblem of innocence, frees from enchantment, and denotes repentance. The month of April is its birth stone. The Greeks gave the diamond the name of "adamant," signifying the "indomitable." The following gems are recorded as sympathizing with what the ancients termed the "Seven Planets."

SATURN	TURQUOISE
JUPITER	CARNELIAN
MARS	EMERALD
SUN	DIAMOND
VENUS	AMETHYST
MERCURY	LOADSTONE
MOON	CRYSTAL

BIRTH STONES.

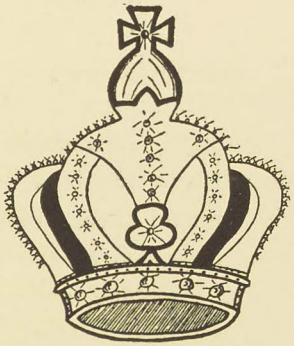
JANUARY	GARNET
FEBRUARY	AMETHYST
MARCH	BLOOD STONE
APRIL	DIAMOND
MAY	EMERALD
JUNE	PEARL
JULY	RUBY
AUGUST	MOONSTONE
SEPTEMBER	SAPPHIRE
OCTOBER	OPAL
NOVEMBER	TOPAZ
DECEMBER	TURQUOISE

EUROPEAN CROWNS

The present crown of Great Britain was wrought for Queen Victoria, with jewels taken from old crowns and other royal insignia. It contained four large pear-shaped pearls, 273 small pearls, 147 table cut diamonds, 1,273 rose cut diamonds, 1,363

brilliant cut diamonds, 5 rubies, 11 emeralds, one large ruby and one large sapphire.

The large ruby has a sadly tragic history. It was at one time in the possession of one of the great kings of Granada, whom Pedro the Cruel invited to his palace and basely murdered through greed of this gem. The enormous sapphire was obtained from the signet of Edward, The Confessor. This crown is the largest of any of the European state crowns, and weighed only two pounds, seven ounces. Its value is placed at $1,- 600,000. The Pope has in his possession two crowns valued at $2,500,- 000, one of which was the gift of Napoleon to Pius VII., and contained the largest emerald in the world. The other was the gift of Queen Isabella of Spain to Pius IV. This weighs three pounds, and is valued at $1,000,000.



Indian mythology attributes the discovery of the pearl to Vishnu, who searched the seas for many years for these ornaments to bedeck his daughter. Among the ancients the pearl was dedicated to Venus and was held sacred to beauty and love. Caligula and Nero ornamented their buskins and strewed the furniture of their salons with pearls. Caligula adorned his horse with a collar of pearls, while the Empress Lollia Paulina, wife

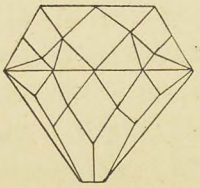
of Caligula, wore a set of ornaments consisting of pearls and emeralds valued at $1,488,000.

The pink Madagascar Beryl is a new gem, and has just reached this country. This new beryl is different in color and luster from any of the semi-precious stones. The hue is a deliacte pink, and the transparent appearance and its hardness give it a peculiar sparkling beauty.

A Brief History of the World's Famous Diamonds.

The Regent or Pitt.

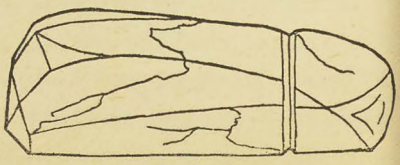
This diamond was found in the year 1701 in the Parteal mines on the Kistna, and weighed 410 carats in the rough. It was cut round or oval, which reduced it to 136 carats in its finished state. This diamond shone resplendent in the sword hilt of Napoleon on the occasion of his marriage to Josephine, and again in his headgear at his marriage to Marie Louise.



The Regent or Pitt.
136 Carats.

The Shah.

This famous diamond appeared in the year 1749, and is of the finest water, being a Table cut. When this stone was first found it was almost in a perfect state, having no flaws; in fact, three of the original facets of the stone were used as originally found in the cutting.



The Shah.
116 Carats.

The Shah has the distinction no other of the famous diamonds have, of being engraved on the table of the stone with the following names of three Per-

sian rulers, who have owned this diamond at various times. These appear in the following order in Arabo-Persian characters.

AKBAR SHAH
NISIM SHAH
FATHH Ali SHAH

This diamond has been cut twice, reducing it to 86 carats.

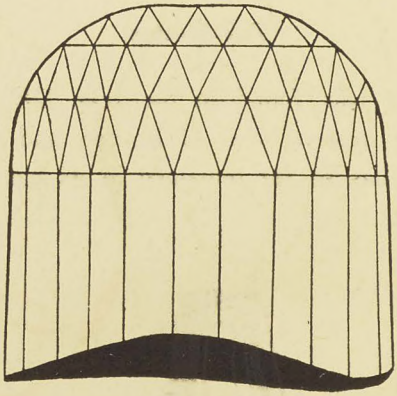
The Mattan.

This diamond was found in the year 1787 in the Landak Mines, near the western coast of Borneo, and had a weight of 367 carats. It has so far remained in its natural state, never having been cut.

The Mattan.
367 carats.

The Orloff.

This diamond is now owned by Russia, and is sometimes called the "Sceptre Gem." It is of a splendid color, having a weight of 195 carats. It is said to have been used at one time as an eye in an idol in one of the largest Brahmin temples, but was stolen from here by a French soldier, after killing three of the native guards.



The Orloff.
195 carats.

The Jagersfontein Excelsior.

This diamond originally weighed 971¾ carats in the rough. It appeared in the year 1881, and was supposed to have been found in the famous Cape Diamond Fields of South Africa.

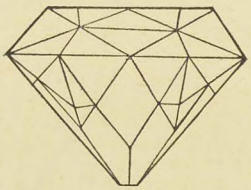
This diamond was recently cut up into ten smaller stones, weighing from fourteen to sixty-eight carats, six pear-shaped drops and four Marquise Brilliants. More than 50 per cent of

the stone was sacrificed in the cutting. The three largest cleavage portions of the Excelsior weighed 158, 147, 189 carats, respectively, from which were cut ten gems of remarkable beauty.

The Jagersfontein Excelsior.
971 3-4 carats.

The Star of the South.

This diamond was found in the year 1853 by a negro slave in the mines of the Providence Minas, Zeraes, Brazil, and weighed 254½ carats in the rough, but was reduced to 125 carats in the cutting.



The Star of the South.
125 carats.

The Hope Blue Diamond.

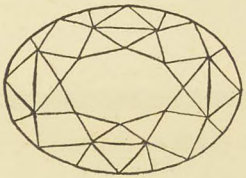
This diamond appeared in the year 1792, and had a weight of 67½ carats in the rough, but was reduced by cleavage and formed into two brilliants, the largest stone weighing 44½ carats. It is often called the "Hoodoo" diamond, on account of the many unfortunate accidents that have befallen its owners from the first to the last.

Jean Tavernier, who stole it from a Hindu god, was torn to pieces by wild dogs. Marie Antoinette, who begged for it and got it, was beheaded. King Louis XIV., who once owned it, was also beheaded. Princess de Lambale, who wore it, was slain by a French mob. William Fals recut it, and died ruined. His son Hendrik stole it from his father, and died a suicide. Henry Thomas Hope, who bought it, suffered misfortune for years, and

Lord Francis Hope, his grandson, became a bankrupt, and also lost his wife. Simon Frankel, a New York broker, once bought it, and was in financial trouble for years to follow. Jacques Colet, another owner, went mad and ended his life, and Prince Ivan Kanitovski was killed by revolutionists.

The Sultan Abdul Hamid bought it, and was dethroned, while the man who sold it to him fell from a precipice with his wife and child. The man who guarded it for the Sultan was hanged by a mob, and Selim Habid, who finally bought it from Abdul Hamid, was drowned in the wreck of the Steamer Le Seyne, off Singapore.

This diamond is now in the possession of M. Rosenau, of Paris.

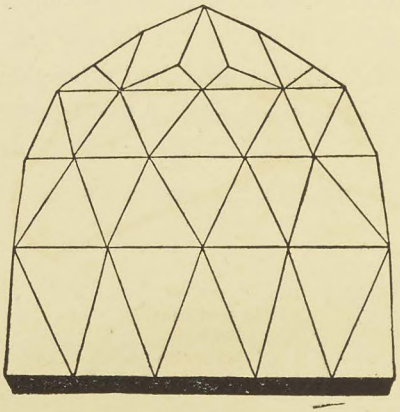


Hope Blue Diamond.
44 1-2 carats.

The Great Mogul.

The date of origin of The Great Mogul is unknown. It is supposed to have been found between the years 1630 and 1650. This diamond gets its name from the original owner, "Shaw-Jehan," the founder of the so-called Mogul Dynasty, in Hindustan.

This famous diamond weighed 787½ carats in the rough. It was supposed to have been originally found in the Kollur Mine, on The Kostna. It is very high on one side and it cut "Rose Cut." The lower edge is slightly cracked, but its color is of the finest water, having a rosy tint. It now weighs 280 carats in its finished state.



The Great Mogul.
280 carats.

The Koh-i-noor.

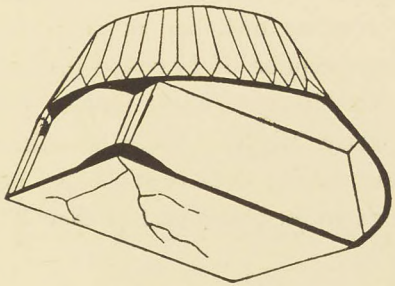
(*Meaning Mountain of Light.*)

This diamond appeared in the year 1739 and was first owned by NADIR SHAH, commonly spoken of as the conqueror of the Mogul Empire.

In 1813 it was traded to the RAJAH of LAHORE, who in turn sold it to the East India company about 1851, who presented it to Queen Victoria.

In 1852 this diamond was again re-cut into an improved form of the brilliant cut, which reduced it to 106 carats. It has been cut three different times.

The Koh-i-noor is not a perfect gem, as generally supposed; in fact, its color is of a slightly greyish tint, and it contains several flaws.



The Koh-i-noor.
"India cut."
186 carats.

The Cullinan Diamond.

Largest Diamond in the World Weighs 3,024 Carats. Valued at $45,000,000.

The Cullinan, or Premier, diamond was found January 26, 1905, in the Transvaal colony, South Africa, by Fred Wells, the manager of the Premier mines.

It exceeds in size, weight and purity all of the famous diamonds ever mined. Its dimensions were four by two and one-half inches, and its color is extremely pure and free from flaws; in fact, it is said to resemble a piece of clear, transparent ice.

This diamond was split into three brilliants and presented to King Edward shortly before he died.

It is reported that another stone of a pure white flawless color has just been found at this same mine, weighing 191 carats. It is said to be two inches long and three-fourths of an inch thick, tapering from one and a quarter to three-fourths of an inch. It is estimated to be worth $150,000 in the rough.

All European countries own one or more of these famous diamonds, with the exception of France, which had theirs stolen some time ago. The history of these famous gems reads like a tale from the Arabian Nights. Wars have been fought over them; empires have fallen; lives been yielded up; intrigue and bloodshed have been an inevitable part of their history.

Ye End.

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